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by W. F. Denning on 'Real Paths of Brilliant Meteors'; by J. C. Kapteyn, J. K. Rees and W. H. Pickering, 'On the Motion of the Nebulæ in the Vicinity of the Nova Persei.' The Rev. Q. A. Wheat concludes his series of papers upon the 'Eclipse Aid to Chronology,' and Dr. Wilson contributes further observations of the 'Light Curve of the New Star in Perseus.'

The first number of a botanical monthly, called *The New Phytologist* has appeared in England. Professor A. G. Tansley, of the University College, London, is its editor and the subscription price is 10 shillings a year. This journal will seek to satisfy an apparent need in Great Britain for a botanical journal with educational aims uppermost. Accordingly especial attention will be given to discussions of scientific questions, methods of teaching and research, notices of important books and papers and preliminary notes. Realizing the labor and sacrifice which such an undertaking involves, we wish Professor Tansley every success and trust that he will obtain cordial support from this side of the water.

SOCIETIES AND ACADEMIES.

THE IOWA ACADEMY OF SCIENCES.

The sixteenth annual meeting of the Iowa Academy of Sciences was held in Des Moines on December 26 and 27, Professor A. A. Veblen presiding. The meetings were well attended and much interest was taken in the program. Thirty papers were presented, many of the more technical being read by title.

The address of the retiring president, Professor A. A. Veblen, was on 'The Relation of Physics to the other Material Sciences.' Physics was the first of the material sciences to develop the modern methods of research. The other branches are greatly indebted to physics for the aids it furnished them, and they in turn are under obligation to physics for the help it has rendered them. Professor Veblen also described several models; one to show the transmission of a wave by transverse vibration; another to illustrate the longitudinal or sound wave; and a third for compounding simple harmonic motions.

'Preliminary Notes on the Flora of Western Iowa, especially from the Physiographical Ecological Standpoint,' was the subject of a paper read by Professor L. H. Pammel. The effects of the soil, climate, altitude, temperature and rainfall on the flora of the region were considered. The flora of the different physiographic regions was given, including the plants of the Missouri floodplain, the bluffs and the upland.

Professor Herbert Osborn presented a paper on the 'Factors of Extinction.' More attention has been devoted to the factors concerned in the production of new types than to the factors of extinction. It is worth while to attempt to formulate those factors which are especially concerned in the elimination of life forms. They were summarized as follows:

(1) That extinction which comes from modification or progressive evolution, a relegation to the past as a result of the transmutation into more advanced forms. (2) Extinction from changes of physical environment which outrun the powers of adaptation. (3) The extinction which results from competition. (4) The extinction from extreme specialization and limitation to special conditions the loss of which means extinction. (5) Extinction as a result of exhaustion.

Professor Maurice Ricker described a 'Large Red Hydra,' found in large numbers in Echo Lake, Flathead County, Montana. The animals are bright coral red in color and the larger ones measure when feeding five eighths of an inch from mouth to proximal end. None of the tentacles was less than two and one-half inches long. So far as known, no other hydra has ever been collected in the State.

The following officers were elected for 1902: *President,* H. E. Summers, of Iowa State College, Ames, Iowa; *First Vice-President,* J. L. Tilton, of Simpson College, Indianola, Iowa; *Second Vice-President,* S. W. Beyer, of Iowa State College, Ames, Iowa; *Secretary,* A. G. Leonard, of the Iowa Geological Survey, Des Moines, Iowa, and *Treasurer,* B. Shimek, of the State University, Iowa City, Iowa.

A. G. Leonard,
Secretary.

THE GEOLOGICAL SOCIETY OF WASHINGTON.

AT the meeting of the Society on February 12 the first paper was by Mr. G. P. Merrill and was entitled, 'Rutile Mining in Virginia.' Mr. Merrill called attention to the fact that recent experiments in the making of cast iron and steel had called for titaniferous alloys. As a result of this, a rutile deposit, situated on the Tye River, near Roseland post-office, Nelson County, Va., had been opened up. The country rock is a strongly foliated gneiss traversed by dikes of hypersthene diabase. The rutile occurs associated with a coarsely crystalline quartz feldspar rock, the exact nature of which has not yet been made out, but which, from the size of the deposit and its crystalline nature, is judged to be eruptive. The rock is a coarsely crystalline aggregate of potash and soda-lime feldspar, of a light gray color, through which are disseminated small rutiles. With it is associated bluish, opalescent quartz, which occurs under such conditions as to suggest that it is not the result of primary crystallization.

In a brief paper entitled, 'Notes on the Geology of the Klondike,' Mr. W. C. Mendenhall sketched the general relations of the rocks in the mining district tributary to Dawson, so far as they are known, and outlined the relations borne by the gold-producing creeks to the geology. A brief account of the occurrence of the gold in the present stream gravels and on the terraces which mark older stream courses was given, and the probability that the gold was derived from stringers or lenses in the schists which are cut by the streams and has not been transported for any distance was brought out.

Mr. Arthur C. Spencer presented a paper on 'The Manganese Ores of Santiago Province, Cuba.' All the manganese produced in Cuba has been shipped from Santiago, the chief city of the easternmost province. The deposits are found back from the coast and are distributed over an extended region. In their mode of occurrence they are replacements of limestone and of calcareous green-sands in localities that have suffered disturbance and folding. From the association of jasper, also replacing calcareous rocks, it is believed that hot circulating water has been active in the formation of these valuable deposits.

Mr. Whitman Cross spoke of the evolution of ideas on systematic petrography in America, referring to the conservative attitude of geologists, presented in text-books, as represented by J. D. Dana; to the propositions for the classification of volcanic rocks presented by Clarence King, regarding them as the only true igneous rocks; and to the proposition made by M. E. Wadsworth. Concerning the part played by petrographers of this country in shaping existing systems, it was pointed out that while but few original proposals of note had been made, the results of the many investigations had almost unconsciously caused a gradual evolution of opinion, even without the influence of any American system.

Mr. R. H. Chapman exhibited some interesting photographs showing stratification in mine dumps.

ALFRED H. BROOKS,
Secretary.

BIOLOGICAL SOCIETY OF WASHINGTON.

THE 349th meeting was held on Saturday evening, February 8.

Dr. C. A. White gave a review of 'The Mutation Theory of Professor de Vries,' giving an outline of his experiments with various plants which had led to his conclusion that evolution was not always a slow process, but that under certain conditions might take place rapidly, and that there was a period in the growth of a race of plants or animals when it was particularly susceptible to external influences.

The paper will appear in the next 'Report' of the Smithsonian Institution.

Henry W. Olds presented 'Some Deductions from the Study of Bird Songs,' prefacing his remarks with the statement that the conclusions he was about to present were merely tentative, but, if corroborated by subsequent investigations, of much importance from their bearing on the question of the evolution of music. Music, he stated, seems to be popularly regarded as artificial and musicians apparently consider it largely, if not entirely, governed by fixed laws, while certain students of the philosophy of the art, such as Helmholtz, Hanslick, Pole and others, believe that the truth lies between these two extremes—that the fundamental rules are governed by physical laws, while more complex questions of form are mainly, at least, arbitrary. The history of music appears to sustain the last view. The evolution of the diatonic scale, the comparatively recent rejection of all modes but the modern so-called major and minor, the absence of rhythm, as we know it, until about the eleventh or twelfth centuries, and of tonality, or reference in melody to a tonic or keynote, until the seventeenth century, all seem to support the theory that many present æsthetical rules of music are temporary and fortuitous and probably of no greater validity than those they have superseded. The octave, fifth and fourth of the modern scale are excepted, by those who hold this view, as resting upon a physical basis; but the other intervals are held to be arbitrary; and the necessity to the modern ear of a definite key, and all the requirements comprised under the term 'form,' are regarded as mainly casual, not necessarily indicating any advance toward a fixed ideal.

But if we find bird music undergoing an evolution that parallels our own progress—if advance in each independently follows the same lines, we have excellent evidence that there is an ideal standard toward which all progress must tend, a law which determines the direction of development of our æsthetical rules. A study of the songs of the birds seems to support this idea. Many birds, as for example the Carolina wren, wood thrush, chickadee and chewink, use the intervals of the modern scale. Birds songs are often rhythmical and may be divided into regular measures properly accented; and several of the formal rules of human music may be found governing the music of the birds.

Mr. Olds gave examples illustrating this statement. These included bits of melody satisfying to the human musical taste, phrases repeated on the same or a different pitch, antiphonal phrases coupled together by a single bird, or by two, with evident intention, and one instance of a song (by the wood pewee) in which the rules of construction governing many ballads were followed. These Mr. Olds said were a few of the instances he had noted indicating a parallel and independent musical evolution and so leading to the conclusion suggested, but he wished to investigate further before positively announcing a principle opposed to the weight of authority and apparently in conflict with previous evidence.

F. A. Lucas.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 546th meeting was held February 1, 1902, Vice-President Marvin in the chair.

Professor Simon Newcomb spoke on 'Recent Views of the Universe.' He called attention to the probability that the density of most stars is much less than that of the sun and the temperature higher; if the sun were removed to the same distance as the stars some of them would appear only 1/100 as bright as it, while *Canopus* and *Rigel* would be more than 1,000 times, probably 10,000 times, as bright. The probability is that most stars have dark bodies revolving around them. Our system is, so far as we know, very unusual in having circular orbits; the stellar orbits are generally quite eccentric, and life such as we know could not probably exist under the extremes of temperature prevailing near any star. The distribution of the stars appears to be remarkably symmetrical around the axis and plane of the Milky Way. The thinning out is slight up to a parallax of .01 second, and the stars extend to at least 1,200 times the distance of *α Centauri*. It is possible that the apparent limit may be due to absorption of light, caused for example by cosmic dust. Reference was made to Lord Kelvin's and J. J. Thomson's recent papers and the fact pointed out that all the new stars are in the Milky Way and therefore probably have a very small parallax, perhaps .001 second, more or less.

Professor F. H. Bigelow, of the Weather Bureau, spoke on 'Aristotle's Physics and Modern Physics.' Aristotle's profound work on the fundamental principles of nature ought to be better known to modern students. He defended the theory of nature which avoids both the extreme idealist view and the extreme material view, and developed the theory of evolution from an inner potential which we now call life. He denied that atoms exist in a vacuum, but held that they possess mutual forces in a plenum. The recent views advanced by Lord Kelvin that the ether is imponderable or non-gravitational matter, and that action at a distance is the law of atoms, seem like a close return to the theory held by Democritus and Aristotle, and in this respect there is agreement between ancient and recent theories. But the startling theory advanced by Lord Kelvin that atoms and ether can occupy the same space identically is of course not in agreement with Aristotle. It is very well worth noting that many points of modern physics were anticipated by Aristotle.

Mr. A. L. Day, physicist of the Geological Survey, began a paper, 'On the Measurement of High Temperature.' An abstract will be deferred till the paper is concluded.

CHARLES K. WEAD,
Secretary.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 326th regular meeting was held January 28. Dr. J. Walter Fewkes exhibited a stone idol from Casas Grandes, Chihuahua, and, commenting on the resemblances of the ruins of northwestern Chihuahua and those of the Gila Valley, said that relief design characterizes the pottery of Casas Grandes, and that while this feature does not prevail in the Gila Valley, the ware is similar to that in the ruins of northwestern Mexico.

President W. H. Holmes, in discussing this paper, traced the distribution of relief work or life form in the United States and Mexico.

Major J. W. Powell's paper, 'An American View of Totemism,' was read by Mr. J. D. McGuire and was discussed by Mrs. M. C. Stevenson, Dr. J. W. Fewkes, and Professor W J McGee.

'Orenda and a Definition of Religion,' by Mr. J. N. B. Hewett, provoked much discussion and the subject was continued for consideration at the next meeting. Orenda is an Iroquoian word meaning mystic potence or magic, and is advanced to supplant the word animism, which seems not adequate to express this elusive belief. Messrs. McGee, Fewkes and Pierce spoke in favor of adopting this word, but Miss Alice Fletcher thinks the word will not cover all forms of belief among our tribes.

WALTER HOUGH.

THE NEW YORK ACADEMY OF SCIENCES.

THE annual meeting of the New York Academy of Sciences was held at 108 West 55th Street on Monday, February 24, at 8:15 P. M., President R. S. Woodward presiding.

The reports of the officers for the last year showed that the affairs of the Academy were in a much more favorable condition than the year previous. The recording secretary reported that the Academy had 298 resident members, of which 92 were fellows, and that the principal work of the council during the year had been that of bringing about a revision of the constitution which would enable the Academy to carry on its work in accordance with the needs of science in New York City. A bill has just been passed by both houses of the State legislature, allowing a revision of the charter, which will enable the Academy to revise its constitution and by-laws, which will very shortly be done.

The publications of the Academy during the year have been small, owing to restricted appropriations; but through economy the finances have been straightened out, and the Academy opens the new year auspiciously. The principal paper besides short ones published in the *Annals*, Volume 14, has been that of Dr. Bashford Dean, entitled 'Paleontological Notes,' and printed as a Memoir, Volume 2, Part 3.

The library of the Academy continues to be housed in Schermerhorn Hall, Columbia University, and is rich in scientific serials, which are kept up to date largely through exchange.

The following honorary members, selected because of their eminent scientific services, were unanimously elected: James Dewar, M.A., LL.D., F.R.S., Jacksonian professor of experimental philosophy, University of Cambridge, England, 21 Albemarle St., London, England; William James, M.D., LL.D., Ph.D., Litt.D., professor of philosophy, Harvard University, Cambridge, Mass.; Wilhelm Wundt, Ph.D., M.D., professor of philosophy, Leipzig, Germany. The number of honorary members is restricted to fifty.

The following resident members, because of their 'scientific attainments or services' to the Academy, were promoted to fellows, in accordance with the by-laws and constitution: Maurice A. Bigelow, Ph.D., Teachers' College, Columbia University; Professor Hermon C. Bumpus, American Museum of Natural History; O. P. Hay, Ph.D., American Museum of Natural History; E. O. Hovey, Ph.D., American Museum of Natural History; W. D. Matthew, American Museum of Natural History; S. J. Meltzer, M.D., 166 West 126th Street.

Ballots were then distributed, and votes counted, and the following officers were elected for the ensuing year:

President, J. McKeen Cattell; *First Vice-President,* Nathaniel L. Britton; *Second Vice-President,* Richard E. Dodge; *Corresponding Secretary,* Bashford Dean; *Recording Secretary,* Henry E. Crampton; *Treasurer,* Charles F. Cox; *Librarian,* Livingston Farrand; *Councilors,* Franz Boas, Hermon C. Bumpus, D. W. Hering, Frederic S. Lee, Chas. Lane Poor, L. M. Underwood; *Curators,* Harrison G. Dyar, Alexis A. Julien, George F. Kunz, Louis H. Laudy, E. G. Love; *Finance Committee,* John H. Hinton, John H. Caswell, C. A. Post.

The president and recording secretary-elect then assumed charge of the meeting, and the retiring president delivered his annual address, entitled 'Measurement and Calculation.' At the close of the address a vote of thanks to the president was carried on motion of Professor Henry F. Osborn, and the academy adjourned.

Richard E. Dodge,
Recording Secretary.

DISCUSSION AND CORRESPONDENCE.

THE UNION AND RIVERSDALE FORMATIONS IN NOVA SCOTIA.

To the Editor of Science: In your issue of January 17, 1902, Vol. 15, No. 368, on page 90, the title and abstract of my second paper read before the Geological Society of America, held in Rochester, are given, which require a slight emendation. The following exact title and brief abstract are herewith submitted:

Title: 'The Meso-Carboniferous Age of the Union and Riversdale formations in Nova Scotia.'

Abstract: From internal paleontological evidence the Union and Riversdale formations are clearly Middle or Meso-Carboniferous. The insect, reptilian, lamellibranchiate, crustaceous and other associated faunas, as well as the floras entombed in the Riversdale shales and sandstones, according to R. Kidston, of Stirling, Scotland; David White, of the U. S. National Museum, Washington; Dr. Wheelton-Hind, of Stoke-upon-Trent, Eng.; S. H. Scudder, of Cambridge; Henry Woodward, of the British Museum, London, Eng., indicate a typical Carboniferous horizon, which, when compared with similar faunas and floras elsewhere, lead one to state that a Meso-Carboniferous age is here represented.

In Cumberland County, Upper Carboniferous limestone beds, formerly classed as Lower Carboniferous, are thrust over siliceous shales and sandstones, etc., presumably of Meso-Carboniferous age, formerly classed as Devonian and referred to the 'rocks of Union' or Union formation. In Pictou and Antigonish Counties, Lower Carboniferous strata rest uncomformably upon the upturned Eo-Devonian, with which the Union and Riversdale formations were formerly correlated by stratigraphers.

H. M. Ami.

Ottawa, January 28, 1902.

HIGH WATER IN THE LAKES OF NICARAGUA.

The numerous heavy flooding rains in Western Nicaragua and consequent rapid rise to unusual height of the water in Lakes Nicaragua and Managua (connected with each other by Rio Tapitapa) in November of last year, indicated that in February, 1902, the water in those lakes would be higher by several feet than the usual annual high water mark, or than since 1859 to 1861, when the height was about 12 feet above the average, and, consequently, that earthquakes and volcanic activity would occur.

The continuous rapid dry current of atmos-